Transportation
Synthesis Report

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Estimating Construction Costs And Using Construction Cost Indexes

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Transportation Synthesis Reports are brief summaries of currently available information on topics of interest to WisDOT technical staff. Online and print sources for TSRs include NCHRP and other TRB programs, AASHTO, the research and practices of other transportation agencies, and related academic and industry research. Internet hyperlinks in TSRs are active at the time of publication, but changes on the host server can make them obsolete.

Request for Report

The Bureau of Project Development requested details on the use of construction cost indexes and on cost estimation practices as they pertain to construction cost increases in recent years. A focus on any pertinent Web sites, reports, or research was the central interest, as well as links to cost indexing sites around the country. How such practices and databases are used or adapted to help anticipate inflationary pressures was another interest.

Summary

Construction cost inflation has state transportation agencies abuzz with efforts to reign in costs and to improve estimation procedures. Though this has not spurred a great deal of research effort, it has nurtured dialogue on the issues within and between agencies around the country.

Increased pressure on an already short steel production market has been triggered by Hurricane Katrina reconstruction and exacerbated by fuel shortages and price increases around the U.S.; and fuel supply issues have impacted asphalt prices as well. Portland cement shortages and increases in costs associated with PVC pipe and other petroleum-based products have also made an impact on construction prices. On the west coast, transportation agency reports often cite Chinese transportation building demand as yet another factor in inflationary pressures.

In response to these developments, FHWA and Washington State have posted Web pages with a wide array of technical reports, white papers, price lists, and descriptions of price indexing practices and links to such activity on other transportation agency Web sites. We offer here a look at Construction Cost Index (**CCI**) and **Cost Estimation** practices and documentation around the country, focusing on **FHWA**'s Program Administration pages, on **Washington** DOT's Contract Administration Pages, and on **California** DOT's pages. We then offer a quick look at a handful of other states that have offered information on the topic in recent months.

Though states do not typically post their Construction Cost Indexes online, in discussion of cost indexing and estimating, historical data seems to be the conventional basis for determining item costs. Clearly, however, agencies struggle to adapt historically based data to the new market norms of pricing they face and to the anticipated increase in such prices.

Federal Highway Administration

The FHWA Program Administration Web pages offer a variety of reports on FHWA policy and practice, and descriptions of and links to various state contract administration pages and papers pertaining to construction cost estimation and indexes. A thorough and indispensable site is "Highway Construction Cost Increases and Competition Issues," which describes a national discourse on construction cost estimation and materials inflation, offers links to cost indexes, surveys on the problems of cost increases and competition, and links to excellent pages around the country that feature similar information for certain state transportation agencies. See Highway Construction Cost Increases and Competition Issues, http://www.fhwa.dot.gov/programadmin/contracts/price.cfm.

CCI. "Price Trends for Federal-Aid Highway Construction" lists construction cost and materials indexes through the third quarter of 2005: http://www.fhwa.dot.gov/programadmin/pricetrends.htm. This site also links to the American Road and Transportation Builders monthly and annual construction material price reports. For the May ARTBA update, see http://www.artba.org/economics_research/recent_statistics/prod_price_index/PPI_May_2006.pdf. For the 2005 annual report, see http://www.artba.org/economics_research/recent_statistics/prod_price_index/PPI_annual_2005.pdf.

In addition to hyperlinks to Washington State DOT pricing and estimating pages, and to the Caltrans' version of CCI, FHWA also offers links to materials price indexes in New York, Ohio, New Jersey and North Dakota.

Cost Estimation. FHWA's Program Administration section does not provide online direction on developing estimation practices. In Major Project Program Cost Estimating Guidance, FHWA notes only that historical bid data, actual cost, or some combination may be used in developing estimates. However, it recommends shoring up such practices with contingency risk assessment measures. These, it suggests, can be used to anticipate and prevent underestimation of construction costs. For details, see "Contingency Fund Management for Major Projects" at http://www.fhwa.dot.gov/programadmin/mega/contingency.htm.

Washington State

WSDOT has posted on the Web a detailed report on highway materials costs and construction estimation, and this document and its constituents are cited on several state Web sites that feature more general information not specifically germane to this report. "Trends in Highway Materials Costs" draws together materials from a variety of in-house sources, including market surveys, Gray Notebook articles, CCI data, and more. It credits Hurricane Katrina construction demands and China's burgeoning construction market as driving inflationary pressures on materials costs, particularly steel and portland cement. To view as a document, see http://www.wsdot.wa.gov/BIZ/CONSTRUCTION/CostIndex/CostIndexPdf/constructioncosts.pdf. As a Web page, with links to individual documents and to CCI and reports from FHWA and California, Colorado and Oregon, see http://www.wsdot.wa.gov/biz/construction/constructioncosts.cfm.

CCI. Currently, WSDOT's Construction Cost Index is updated quarterly based on bid data tracked since 1990 on seven materials categories:

- Crushed surface materials;
- Concrete pavement;
- Structural concrete;
- Hot-mix asphalt;
- Steel reinforcing bar;
- Structural steel;
- Roadway excavation.

WSDOT tracks its CCI against that of the FHWA and of California, Colorado, Oregon, South Dakota, and Utah. It also checks its CCI against the quarterly updated CCI in *Engineering News-Record*: http://enr.construction.com/features/conEco/subs/default.asp. (On its Asset Management pages, FHWA recommends the use of ENR's construction cost index; see http://www.fhwa.dot.gov/infrastructure/asstmgmt/primer03.htm.)

Cost Estimation. Generally, WSDOT tries to eliminate risk elements in contracts by subjecting bids to unit price adjustments from time-of-bid base bid costs. In its toolbox for management of materials-related inflation in construction are:

- Time bids to hit cost windows;
- Grant flexibility to contractors to encourage seeking of economic value;
- Offer early payment provisions to lock in material prices close to bid time;
- Cost reduction incentives;
- Adjust project scope to limit materials needs;
- Cancel projects that materials inflation has made too expensive.

Cost Estimate Validation Process and Cost Risk Assessment. This site describes various WSDOT efforts to continually identify and quantify risks that impact project budgets. The site features links to estimating resources as well as descriptions of the validation process. See http://www.wsdot.wa.gov/Projects/ProjectMgmt/RiskAssessment/Resources.htm.

California

Washington, FHWA, and various other agencies refer to Caltrans practices, which regularly update cost indexes and provide a well-detailed estimation procedure.

CCI. Construction Price Indexes can be found at http://www.dot.ca.gov/hq/esc/oe/contract_progress/chcci.html. These are updated quarterly. Monthly indexes for certain items may not be generally available, but an FHWA link to a Caltrans monthly asphalt paving price index shows fairly dramatic swings in price in recent months. See http://www.dot.ca.gov/hq/esc/oe/asphalt_index/astable.html.

Cost Estimation. Cost estimation guidelines are covered in detail in a project development manual appendix, "Appendix AA-Cost Estimates, Preparation Guidelines for Project Development Cost Estimates." This is a detailed explanation of the Caltrans approach to cost estimation. http://catc.ca.gov/hq/oppd/pdpm/apdx_word/apdx-aa.doc.

The method breaks estimating processes into separate phases for project planning and for project design. Price estimation methodologies involve one or both of two methods. The Previous Bid Prices Method involves gathering historical bid data and applying various adjustments, and entails consulting cost indexes, bid summaries, annual cost data reports, and more. The Complete Analysis Method, considered practical for only select items in certain projects, draws upon materials and price lists, assesses production rates, and analyzes operation to include overhead costs, profit needs, and more.

Other Agencies

The following sites offer information on how other states are thinking about or acting on construction cost increases.

Colorado. CDOT's annual report on its construction cost index is available on line. http://www.dot.state.co.us/App_EEMA_CDB/CCI2005Q4.pdf.

Florida. In an effort to address a significant reduction in the number of bids received on construction projects, and an inflation in bid amounts well above expected numbers, Florida DOT in 2005 surveyed construction engineers around the country on whether they had experienced cost increases, and what efforts the agency or state had undertaken to address such increases. Eighteen states, including Wisconsin, responded. See the summary at http://www.fhwa.dot.gov/programadmin/contracts/fdotquestionnaire.cfm.

In February 2006, FDOT drew together employees, contractors and consultants for a summit on developing strategies to counter price increases. For a summary of the meeting's findings, see http://www.fhwa.dot.gov/programadmin/contracts/fdotpromises.cfm.

Ohio. Ohio DOT is currently reviewing its estimating framework for materials and bridge and pavement projects. Construction cost commodities inflation was 11.1 percent from January 2005 to 2006, and ODOT believes this cannot be attributed to short-term fluctuation because of fuel shortages, Hurricane Katrina, Middle East conflict, or other temporary factors. Rather, ODOT believes that fuel, steel, cement and asphalt prices have reached a new plateau that will be a permanent baseline for future inflationary increases. See "Inflation's Effects on ODOT's Program, Apr. 19, 2006: http://odotoutlook.dot.state.oh.us/documents/inflation_whitepaper.pdf.